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other earlier evolutionists) has given it a certain standing in the literature of bionomics.

A student in my laboratory, Miss Lilian Ramsay, in a general study of variation and heredity in certain insects, has been able to gather some definite data in regard to assortative mating (the basic assumption of the physiological isolation theory) in the case of an insect species common on our university campus. Unfortunately the earthquake of last April interrupted her interesting observations. Her data are the following:

The lady-bird beetle, *Hippodamia convergens*, is an insect of much variability as to its dorsal color pattern (dorsal surfaces of the two wing-covers). The modal type shows a red-brown ground bearing twelve small black spots (six on each wing-cover). The variation in additions to or subtractions from these normal twelve spots, and in their arrangement, is so large, extending from a condition of total absence of spots to that of the presence of eighteen distinct spots, that we have been able to describe, in words, some eighty-four 'aberrations' or pattern types of this species. As any of these variations may appear in conjunction with any others in a single brood (one clutch of eggs), it is certain that these aberrations are all included within the species. Is there now any assortative mating among these variations?

In March and April Miss Ramsay found the beetles mating on the wild mustard on which their food, the mustard aphids, swarms. Collecting these actually mating couples, she brought them into the laboratory, noted the pattern types to see if assortative mating on a basis of pattern—this being largely the basis for specific separation in the genus—was occurring, then put each couple into a breeding jar to obtain the eggs and rear the young, to ascertain if the various matings were similarly fertile. The earthquake interrupted the collecting and made impossible the determination of fertility. The actual matings of sixty

couples as they occurred normally in nature were as follows:

Thirty cases of twelve-spotted *Hippodamia convergens* with twelve-spotted *H. convergens*.

Thirteen cases of twelve-spotted *H. convergens* with spotless *H. convergens*.

Five cases of spotless *H. convergens* with spotless *H. convergens*.

Two cases of twelve-spotted *H. convergens* with two-spotted *H. convergens*.

Two cases of one-spotted *H. convergens* with spotless *H. convergens*.

One case of twelve-spotted *H. convergens* with ten-spotted *H. convergens*.

One case of two-spotted *H. convergens* with spotless *H. convergens*.

One case of spotless *H. convergens* (female) with *Megilla vittigera* (male), a distinct species with three strong, longitudinal stripes instead of spots.

Also there were noted seven cases of the mating of plain *Coccinella californica* with plain *C. californica*, and one case of plain *C. californica* with two-spotted *C. californica*. *Coccinella californica* also frequently mates with *Hippodamia convergens*, as we have observed at various times.

As regards relative abundance of the various variation types of *Hippodamia* and *Coccinella*, the twelve-spotted and the spotless *Hippodamia* individuals far outnumbered any other types and the spotless *Coccinellas* were much more numerous than spotted ones.

The matings, therefore, seem obviously to be wholly non-selective; they are chance matings, that is, follow the law of probability. All the individuals, spotless, twelve-spot and few-spot, mingle freely on the same mustard plant, so that the matings might readily be assortative. If not assortative, then the relative proportion of numbers of the different types should determine the matings. And this is what apparently really obtains.

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THE SALARIES OF PROFESSORS.¹

DESPITE the heavy burdens upon the cor-

¹From the report of President Butler, of Columbia University.

¹ See Kellogg and Bell, 'Studies of Variation in Insects,' *Proc. Wash. Acad. Sci.*, Vol. 6, pp. 203-332, 1904, for a detailed account of the variation of the species.

poration as referred to at length in another part of this report, it is not possible longer to avoid facing the fact that the salaries paid to the professors and adjunct professors of the university are inadequate, and that the effects of this inadequacy are deplorable.

So long ago as 1857, the trustees gave serious consideration, at the hands of a special committee, to the subject of the compensation which should properly be paid to the professors in Columbia College.

On May 11, 1857, it was

Resolved, That the incumbents of the chairs of chemistry, of mathematics, of moral and intellectual philosophy, of ancient and modern literature and of history and political economy, should severally receive a salary at the rate of \$3,000 per annum.

At the same time it was provided that in addition to such salary there should be allowed to those professors to whom a dwelling was not assigned at the college, a sum not exceeding \$1,000 per annum for house rent. In the course of a few years this provision resulted in making the salaries of the incumbents of the chairs named \$4,000 each.

In 1861 it became necessary to reduce the expenses of the corporation, and in that year a substantial reduction was made in the amount of the salaries paid to the several professors. Those professors who had been in receipt of an annual salary of \$4,000 each had their compensation reduced to \$3,600 each, and one professor who had been in receipt of a salary of \$3,300 had his compensation reduced to \$2,900.

At the time when this reduction in compensation was made there were, in addition to the president, but ten professors in the service of the college.

On February 5, 1866, a select committee of five, which had been appointed to consider and report upon the amount of salaries and compensation received by the several members of the faculty, and to consider and report whether it was expedient or proper to make any changes in the rate of compensation allowed to any or all of the professors, and whether it was expedient or proper to discriminate between the several professors as

to their salaries or rate of compensation, and if so, as to how such discrimination should be made, submitted an elaborate report.

It appeared that at the date of the report there were, in addition to the president, seven professors in active service in Columbia College. Of these, five received salaries of \$4,000 each, one a salary of \$3,300 together with the free occupancy of a house, the rental of which was estimated at \$700, and one a salary of \$1,800. The professor of municipal law received a salary of \$6,000 and a proportion of the tuition fees of the students of law, which for the year covered by the report had increased his salary to \$7,607.64. The professor of political science received a salary of \$4,000, and the three professors in the newly established School of Mines received salaries of \$3,000 each.

The special committee made inquiry as to the salaries paid at other institutions of learning, and reported that at Union College the stated salary of a professor was \$1,500, to which had been added for each of the two years past an increase of 20 per cent., or \$300. The usual salary of a professor at Yale College was \$2,300, and at Harvard College, \$2,400. The committee pointed out that the three institutions mentioned were all situated in places where the expenses of living were less than in the city of New York, and that this difference should be borne in mind in estimating the value of the salaries received by the professors in the several institutions.

The committee also stated that, inasmuch as Columbia College was chiefly dependent upon private liberality for support and had but slender means of its own, the compensation then paid to its professors was inadequate as a result of necessity and not from choice, and that, therefore, no proper conclusion could be drawn as to what the salary of a professor should be from the amount then paid.

After reviewing all the information at their command, the special committee expressed the opinion that the salaries paid to the professors of Columbia College were adequate at the time they were established, but that the time had come when they should be changed. The

committee expressed a willingness to discriminate in regard to the compensation to be paid to the several professors, and suggested that the only proper basis of discrimination was to be found in the amount of service rendered by each. The committee admitted the difficulty, and perhaps the impracticability, of running an even line of justice in making such discriminations, but were prepared to accept usage as throwing some light upon the discriminations which might wisely be authorized.

It is interesting to observe that then as now the professors were confronted by problems due to the greatly increased cost of living. In the belief, apparently, that this increased cost was the result of the civil war and would not continue, the committee recommended that all salaries be increased by twenty-five per cent. for each of two years. The effect of these recommendations was to fix the salaries of the chief chairs in the college at \$4,000, and to make an additional grant of \$1,000 each to the incumbents of such chairs for each of two years. Subsequently, on several occasions, the trustees made a temporary augmentation in the salary of the professors, with the result that at one time the incumbents of the leading chairs were in receipt of a compensation of \$6,000.

This was the situation when, on December 6, 1875, the trustees received a communication signed by each of the eight professors then in active service in the college, from which the following quotation may be made:

In the year 1857 the trustees of the college established a rate of compensation for the professors, which they deemed just and no more than adequate.

In consequence of the greatly increased cost of living produced by the war of the rebellion and other causes, the trustees increased the compensation of their professors—but the experience of our body has made us feel keenly that the increase in the cost of living has been greater than that of the compensation. The professors were in better condition seventeen years ago than they are now, when the college has so much ampler means.

Not only do we find it impossible to save anything from our salaries for future needs or for

our families, but we are unable to meet our necessary expenditures without drawing upon other resources or seeking uncongenial and inappropriate employment. We believe that the true interests of our college require that the compensation of its professors should be such as to free them from the necessity of extraneous work merely for pay. Feeling severely the annually increasing pressure of narrowed means, and the distracting influence of the ever-recurring difficulty of providing for our household necessities, we respectfully present this statement to your honorable board, and request that you will give it a generous consideration.

The communication was referred to a special committee of five members of the board, consisting of Mr. Rutherford, Mr. Nash, Mr. Schermerhorn, Mr. Harper and Mr. Beekman.

On February 7, 1876, this committee presented a careful report in which it was stated that the committee's recommendations were governed by the following considerations:

1. That the chairs of our principal academic professors should be looked upon as dignified and most desirable positions, capable of commanding the services and satisfying the reasonable ambition of the highest grade of talent and most extensive acquirement, and that to this end these professors should be placed upon a social and pecuniary equality with at least the average of successful professional men and freed from the grinding cares incident to a struggle to reconcile the demands of a conspicuous and responsible position with the necessities of insufficient means.

2. Your committee are satisfied that in the city of New York, with its high rents, high prices, and countless social demands, a yearly salary of \$6,000 is inadequate to place the professors in the position it is desirable they should occupy.

3. Your committee think that it would be unwise to remove the statutory restrictions which now prevent an academic professor from engaging in any professional or other pursuit. They are also of opinion that it is a wise discrimination which has not applied any such restriction to the professors of the Schools of Mines and of Law. No such restrictions exist, so far as your committee have been able to learn, in the academic department of any other American college, in most of which the professors engage in outside work and in many cases hold professorships in other institutions; but this undesirable condition is

chiefly due to the inability of the colleges to pay adequate salaries.

The committee thereupon recommended that the salaries of the professors of Greek, chemistry, mathematics and astronomy, moral and intellectual philosophy, mathematics, mechanics and physics and Latin be fixed at \$7,500 each.

This report was accepted and its recommendations were adopted. This very satisfactory scale of compensation for professors was not, however, maintained for more than a few years. One or two new chairs were established and their incumbents compensated at this rate. About this time, however, began the rapid expansion of the college into a university, and the resources of the corporation were far from sufficient to permit the payment of this compensation to the large number of new professors who were from time to time appointed.

As a consequence, while the maximum salary paid to a professor in the university has not been altered since the action of the trustees in 1876, it is a long time since any appointments have been made at that maximum compensation. The budget for 1906-7 shows that there are 119 professors and 39 adjunct professors in the service of the university at the present time, excluding clinical professors and those upon the Barnard College and Teachers College foundations. Of these, 111 professors and all 39 adjunct professors are in receipt of compensation. The average salary paid to the 111 professors in receipt of compensation is \$3,746.85, and the average salary paid to the 39 adjunct professors is \$2,126.92. It will be seen, therefore, that the average salary paid to a Columbia University professor in 1906 is almost exactly one half of the sum named by the trustees in 1876 as necessary to enable him to maintain his proper position in the community.

Serious as this comparison appears at first glance, a consideration of all the attendant circumstances will make it more serious still. If the professors of 1876 were able to make successful appeal for an increase of compensation because of the increased cost of living as compared with 1857, what shall be said of

the professors of 1906, who have to meet a cost of living increased far beyond the standard which prevailed in 1876?

It is possible, by reference to undisputed authority, to show with some precision what changes have occurred during the past thirty years in the price of those articles which enter most largely into the cost of living.

From 1860 to 1873 wholesale and retail prices in the United States, expressed in terms of the gold dollar, rose irregularly until in the latter year they were substantially 27 per cent. higher than in 1860. This conclusion was reached in the 'Senate Report on Wholesale Prices' in 1891 (Part I., page 99) and is substantially confirmed by the index numbers made use of by the London *Economist* and by the computations made by Sauerbeck, the high German authority. Professor Mayo-Smith in a careful critical article on 'Movements of Prices,' which appeared in the *Political Science Quarterly* for September, 1898, accepted as substantially conclusive the general agreement of Sauerbeck, the *Economist* and the senate report, so far as these early figures are concerned.

The senate report in question was devoted chiefly, however, to the fall of prices alleged to have occurred from 1873 to 1891. Many statisticians hold that the senate report, because of the particular articles selected by it for price quotation, greatly exaggerated the decline of prices between 1873 and 1891. Professor Mayo-Smith regarded the figures of Sauerbeck and the *Economist* as the more trustworthy for the later period. After summarizing Sauerbeck's index numbers from 1879 to 1898, Professor Mayo-Smith reached this conclusion:

It will be observed that this table is based entirely upon the wholesale prices of foods and raw materials. The total index number shows that since the period 1866 to 1877 there has been a fall of 36 per cent. in average prices. The fall has been greatest in textiles; the next heaviest fall has been in sugar, coffee and tea; the least fall has been in animal food. In most cases the fall seems to have reached its lowest point about 1896. (*Statistics and Economics*, p. 203.)

Analyzing groups of commodities used in

the senate report, Professor Mayo-Smith points out the important fact that it was not in the real necessities of life that the fall occurred from 1873 to 1896. He says:

But the different groups behave in a very extraordinary way. Food is at about the same level as in 1860, while lumber and building materials have actually increased 22 per cent. The manufactured articles, such as cloths and clothing and house-furnishing goods show a very great decrease. (*Ibid.*, p. 205.)

While, therefore, the cost of living was, on the whole, lower in 1896 than in 1876, the decrease appears to have been in the conveniences and comforts rather than in the immediate necessities of life.

For the years 1897 to the present time, we are so fortunate as to have a very careful and trustworthy record of prices compiled by the department of commerce and labor, and published in the *Bulletin of the Bureau of Labor*, No. 63, March, 1906. This report shows that a rapid and continuous advance of prices has gone on since 1896. Summarizing the prices quoted the *Bulletin* says:

Wholesale prices, considering all commodities, reached a higher point in 1905 than at any other time during the sixteen years covered by this investigation. * * * The 1905 average, compared with the year of lowest average prices during the sixteen years from 1890 to 1905, in each of the general groups of commodities, shows farm products 58.6 per cent. higher than in 1896; food, etc., 29.7 per cent. higher than in 1896; cloths and clothing 22.9 per cent. higher than in 1897; fuel and lighting 39.4 per cent. higher than in 1894; metals and implements 41.8 per cent. higher than in 1898; lumber and building materials 41.4 per cent. higher than in 1897; drugs and chemicals 24.1 per cent. higher than in 1895; house-furnishing goods 21.5 per cent. higher than in 1897; and the articles included in the miscellaneous group 23.4 per cent. higher than in 1896. (P. 338.)

A comparison of these authoritative statements appears to justify the following conclusions:

That the rise of prices since 1896 has considerably more than offset the fall from 1873 to 1896; that there has been an advance of at least 10 per cent. beyond the level of prices

that prevailed in 1876, and that the prices of such fundamental necessities of life as farm products and building materials are probably at least 50 per cent. higher than they were in 1876, at which date they were, according to the senate report (Part I., p. 99), at least 10 per cent. higher than they had been in 1860. Specifically food was 9.1 per cent. higher and building materials 21.7 per cent. higher.

The important facts, then, are: (1) That the present average salary paid to a Columbia University professor is but one half of the sum fixed as necessary thirty years ago; and (2) that the cost of living has meanwhile increased between 10 and 20 per cent. The purchasing power of the average salary of 1906 is, therefore, hardly more than 40 per cent. of the purchasing power of the salary established in 1876. In other words, the great and noteworthy expansion of the university, which has been brought about by the labors of the university teachers, has also been brought about at their expense.

Perhaps no class in the entire community has suffered more from the rise in the cost of living than the college and university teachers. A recent publication by the department of commerce and labor indicates that the wages of manual laborers are increasing just now faster than the cost of living; but with the college and university teacher the reverse is the case.

The most important need to this university at the present time is an addition to the endowment fund sufficient to enable the establishment and maintenance of a proper standard of compensation to members of the teaching staff. When the action of 1876 was taken, there were but seven professors to be affected by it. A very small sum of money sufficed then to make a very substantial addition to the salary of each. Now there are 119 professors and 39 adjunct professors, 158 in all. To increase the salary of each by only one thousand dollars on an average—not at all an adequate amount—would absorb the interest at 5 per cent. on a capital sum of more than three million dollars. Nevertheless, this great sum must be obtained and these compensations must be fixed and paid

or we cannot hope to attract and keep the best men in the teaching profession, nor can we enable those already in it to represent the intellectual and moral interests of the community as those interests should be represented. A capital sum of five million dollars, yielding $4\frac{1}{2}$ per cent. per annum, is required at the present time to establish a proper rate of compensation for the teaching staff of Columbia University, without adding a single new instructor to that staff. This need is so imperative and the public interests affected by it are so large and so important, that the mere statement of it ought to bring us the needed sum, great though it is, from the men and women who are the large-minded possessors of wealth in this community.

SCIENTIFIC NOTES AND NEWS.

THE Nobel prize in medicine for 1906 will be divided between Professor Camillo Golgi (Pavia) and Professor Ramon y Cajal (Madrid).

THE Royal Society's medals have this year been adjudicated by the president and council as follows: the Copley medal to Professor Elias Metchnikoff for the importance of his work in zoology and in pathology; the Rumford medal to Professor Hugh Longbourne Callendar for his experimental work on heat; a Royal medal to Professor Alfred George Greenhill for his contributions to mathematics, especially the elliptic functions and their applications; a Royal medal to Dr. Dukinfield Henry Scott for his investigations and discoveries in connection with the structure and relationships of fossil plants; the Davy Medal to Professor Rudolf Fittig for his investigations in chemistry and especially for his work in lactones and acids; the Darwin medal to Professor Hugo de Vries on the ground of the significance and extent of his experimental investigations in heredity and variation; the Hughes medal to Mrs. W. E. Ayrton for her experimental investigations on the electric arc and also upon sand ripples. The medals will, as usual, be presented at the anniversary meeting on St. Andrew's Day (November 30).

LORD RAYLEIGH has been recommended for reelection as president of the Royal Society and the other officers will be the same as last year, except that the following new members of the council have been nominated: Lord Avebury, Sir Benjamin Baker, K.C.B., Dr. H. F. Baker, Prof. David Ferrier, Prof. Sydney J. Hickson, Dr. Alexander Scott, Prof. A. C. Seward, Prof. W. J. Sollas, Prof. E. H. Starling, Prof. Silvanus P. Thompson, and Dr. A. D. Waller.

A PORTRAIT of Dr. Henry M. Hurd, superintendent of the Johns Hopkins Hospital, was presented to the hospital by the medical staff at a dinner given in honor of Dr. Hurd on November 1. Dr. William H. Welch presided at the dinner and made the presentation speech, and speeches were also made by Dr. Ira Remsen and Dr. D. C. Gilman. The portrait, which is by Mr. Chase, will be hung in the library. Dr. Hurd sailed for Europe on November 5, where he will remain for about a year.

IN the early part of October the Yale Association of Japan gave a reception in honor of Professor G. T. Ladd, who is now in Tokyo.

PROFESSOR TH. W. RICHARDS, who is going to Berlin in the second half year as Harvard's representative in the annual exchange of professors, will give while there a course of lectures on the 'Fundamental constants of physical chemistry.'

PROFESSOR L. H. BAILEY, director of the College of Agriculture, Cornell University, was elected president of the Association of Agricultural Experiment Stations at its recent meeting at Baton Rouge.

MME. CURIE gave her inaugural lecture at the Sorbonne on November 5.

WE learn from *The American Anthropologist* that the title of honorary curator has been conferred by the Cincinnati Museum Association on Mr. Philip M. Hinkle, who has undertaken the care of its collections relating to American archeology. With him are associated Mr. Frederick W. Hinkle and Dr. G. B. Rhodes.

MR. ROBERT H. BAKER, M.A., for three years assistant to Professor Todd, in Amherst Col-